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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/774,315
Filing Date: February 06, 2004
Appellant(s): HAO ET AL.

Philip S. Lyren
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/18/2007 appealing from the Office action mailed 12/20/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

D. Keim, M.C. Hao; U. Dayal; "**Hierarchical pixel bar charts**", IEEE Trans. On Visualization and Computer Graphics, Vol. 8, No. 3, July-Sept. 2002, pp. 255 – 269.

5,893,090 Friedman et al. 4-1999

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 6-18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by D. Keim, M.C. Hao; U. Dayal; **"Hierarchical pixel bar charts"**, IEEE Trans. On Visualization and Computer Graphics, Vol. 8, No. 3, July-Sept. 2002, pp. 255 – 269 (hereinafter Keim-2002).

Re Claim 1:

Keim-2002 **discloses a method for presenting data, comprising:**

Receiving the data (*e.g., Figures 2-4 of Keim-2002 disclose receiving a set of data items corresponding to a set of records such as e-commerce sales transactions with data records having such attributes as product type, number of visits and dollar amounts; the product type is used later as the partitioning attribute and the number of visits and dollar amounts as the x and y ordering attributes. The color represents the dollar amount spent by the corresponding customer wherein high dollar amounts correspond to bright colors and low dollar amounts to dark colors*);

Deriving a multi-level dynamic hierarchical structure (*e.g., Figs. 7-8, 10, 12-17 and Section 3.3 demonstrated the pixel bar charts for the multi-dimensional data records with*

multiple attributes and each multi-level bar chart corresponds to a hierarchical structure) **for the data based on drilldown sequences input from a user** (*e.g., layered drill-down/detail-on-demand as disclosed in Section 3.3 and interactive data exploration and each customer's detail information can be* ***drilled down*** *as needed; see Fig. 7-8 for the hierarchical pixel bar chart*), **wherein** (*SEE MPEP 2111.04 [R-3] "Adapted to," "Adapted for," "****Wherein****," and "Whereby" Clauses. Claim scope is not limited by claim language that suggests or makes optional but does not require steps to be performed, or by claim language that does not limit a claim to a particular structure. The Examiner suggests deleting the "wherein" clause to positively identify the following claim limitation. Nevertheless, the claim limitation is still treated in the present Office Action)* **the drilldown sequences automatically compute a graphical visual comparison** (*Figs. 7-8, 10 and 12-17 clearly shows the graphical visual comparison of the hierarchical pixel bar chart and the regular pixel bar chart*) **of the data and comprise:**

Deriving a multi-pixel bar chart that simultaneously displays numerical values of aggregated data for plural bars (*e.g., "Aggregated data" is a broad term and is thus subject to the broadest reasonable interpretation consistent with the specification. The distribution data for each of the pixel bar is the aggregated data. Figs. 7-8, 10, 12-17 and the corresponding description of the prior art illustrating a plurality of multi-pixel bar charts with each bar chart displaying an aggregated distribution paradigm of data records including the display of numerical values, e.g., Figs. 10, 12 and 16; See Section 5.2 describes that Fig. 12 has displayed the height of a bar to show the average or aggregated value and the average/median lines are shown to separate a bar into two parts and therefore the average/median numerical values are shown as the heights of the plural bars. Moreover, the numerical values of the aggregated data*

for the plural bars are shown as the numbers on the top of the plural bars in Figs. 4, 10 and 12 in which Figs. 2 and 4 show the numerical values corresponding to the heights of the bars and so the numerical values corresponding to the median lines of the bars in Fig. 12 are determined according to their heights); and

Deriving a graphical illustration that displays a comparison of the numerical values (*See column 1, Page 264 for Threshold interaction and Average/Median Lines wherein the cited reference teaches thresholds can be interactively changed and thus displayed as needed and the areas that exceed the threshold value are identified so that the colored areas display a comparison of the numerical values of the aggregated data. Moreover, the heights of the plural bars as displayed showed a comparison of the average values of the aggregated data for the plural bars to easily identify the difference in data distribution between the upper portions and lower portions of the plural bars; see Fig. 12a. Finally, Fig. 17 shows the high and low search criteria numerical value settings on the screen; see Page 268 for this teaching in the cited reference. See also Fig. 7 and Section 3.3-3.4 wherein the different levels of the hierarchy are indicated by different heights of bars belonging to that level and the colored pixels corresponding to the different attribute values of the same data item have a unique position within the bars. See Section 3.1 the high dollar amounts correspond to bright colors and low dollar amounts to dark colors. Moreover, the numerical values of the aggregated data for the plural bars are shown as the numbers on the top of the plural bars in Figs. 4, 10 and 12 in which Figs. 2 and 4 show the numerical values corresponding to the heights of the bars and so the numerical values corresponding to the median lines of the bars in Fig. 12 are determined according to their heights*) **of aggregated data** (*e.g., Figs. 7-8, 10, 12-17 and the corresponding*

description illustrated a plurality of multi-pixel bar charts with each bar chart reflects the data distribution in the pixel placement algorithm wherein data partitioning is based on the data histograms ***and data distributions according to the coloring clusters and trends are illustrated therein****. For example, Page 266 describes the graphical illustration that displays the busiest time in the middle of the day during hours 9, 10, 12 and 14 with wider bar widths of the bars in Fig. 16a wherein the wider bar widths clearly show a comparison in the numerical values of the aggregated data for the hours of concern. Moreover, the number of transactions are the numerical values of the aggregated data that are colored green in the pixel bar chart and therefore the numerical values of the aggregated data are displayed as green for comparison purposes. Moreover, in Fig. 16, red areas* ***> 25 seconds response time*** *are colored red which are used to display a comparison of the numerical values on the pixel bar chart. Finally, the average/median numerical values are shown as the heights of the plural bars. Moreover, the numerical values of the aggregated data for the plural bars are shown as the numbers on the top of the plural bars in Figs. 4, 10 and 12 in which Figs. 2 and 4 show the numerical values corresponding to the heights of the bars and so the numerical values corresponding to the median lines of the bars in Fig. 12 are determined according to their heights*).

In other words, Keim-2002 discloses hierarchical pixel bar charts to exploit the hierarchy and split the bars for selected portions of the hierarchy to show more detailed information for the selected portion of the data (Section 3.3 on Page 258). Keim-2002 discloses in Fig. 8(b) a data distribution paradigm. Moreover, Keim-2002 discloses in Fig. 8(b) the claim limitation of deriving a multi-level dynamic hierarchical structure (Section 3.3 of Keim-2002) for the data based on drilldown sequences input from a user by the *layered drill-down/detail-on-demand as*

disclosed and interactive data exploration and each customer's detail information can be drilled down as needed wherein the interactive selection allows the user to drill-down to see more details for interesting subsets of the data (Section 3.3 of Keim-2002), wherein the drilldown sequences automatically compute a graphical visual comparison of the data and comprise: deriving a multi-pixel bar chart to display an aggregated distribution paradigm and deriving a graphical illustration to display a data distribution paradigm (**Page 258 and Section 3.3 and Fig. 7(b), Fig. 8(b)**).

Re Claim 3:

The claim 3 encompasses the same scope of invention as that of the claim 1 except additional claim limitation the plural bars of the multi-pixel bar chart have equal heights.

However, Keim-2002 further discloses the plural bars of the multi-pixel bar chart have equal heights (*e.g., Figs. 5 and 16*).

Re Claim 6:

The claim 6 encompasses the same scope of invention as that of the claim 1 except additional claim limitation inputting preferences from the user for a plurality of different levels of the multi-level hierarchical structure.

However, Keim-2002 further discloses the claim limitation inputting preferences from the user for a plurality of different levels of the multi-level hierarchical structure (*e.g., the partioning algorithm assigns each data record to the corresponding bar according to the partitioning attributes and the attributes used for portioning, ordering and coloring can be*

selected and changed at execution time). Keim-2002 discloses in Section 5.3 and Fig. 7(b) inputting preferences from the user for a plurality of different levels of the multi-level hierarchical structure.

Re Claim 7:

The claim 7 encompasses the same scope of invention as that of the claim 1 except additional claim limitation deriving a multi-pixel bar chart further comprises ordering a plurality of bars according to product ranking.

However, Keim-2002 further discloses the claim limitation deriving a multi-pixel bar chart further comprises ordering a plurality of bars according to product ranking (*e.g., Fig. 6 shows dividing attributes on x-axis being the product ranking/ordering according to the product type*). Keim-2002 discloses in Section 3.3, 5.3 and Fig. 8(b) ordering a plurality of bars according to product ranking.

Re Claim 8:

The claim 8 encompasses the same scope of invention as that of the claim 7 except additional claim limitation arranging three consecutive bars to have a highest ranking and arranging three consecutive bars to have a lowest ranking.

However, Keim-2002 further discloses the claim limitation arranging three consecutive bars to have a highest ranking and arranging three consecutive bars to have a lowest ranking (*e.g., Figs. 4 and 6 shows dividing attributes on x-axis being the product ranking/ordering according to the product type wherein Fig. 4 shows the three-consecutive bars of the highest*

ranking and the three-consecutive bars of the lowest ranking). Keim-2002 discloses in Section 5.3 and Fig. 8(b) arranging three consecutive bars to have a highest ranking and arranging three consecutive bars to have a lowest ranking as arranged in the pixel bar chart.

Re Claim 9:

The claim 9 encompasses the same scope of invention as that of the claim 1 except additional claim limitation coloring pixels green and coloring pixels red and the green pixels representing higher sales than the red pixels.

However, Keim-2002 further discloses the claim limitation coloring pixels green and coloring pixels red and the green pixels representing higher sales than the red pixels (*e.g., Figs. 5 and 16 shows the coloring of pixels to green or red and dark colors representing higher sales*). Keim-2002 discloses in Section 5.3 and Fig. 8(b) coloring pixels green and coloring pixels red and the green pixels representing higher sales than the red pixels.

Re Claim 10:

Keim discloses:

Determining a set of attributes for placement of the data in a pixel bar chart having plural bars that each include a plurality of pixels with each pixel encoded with a portion of the data (*e.g., Figures 2-4 of Keim-2002 disclose receiving a set of data items corresponding to a set of records such as e-commerce sales transactions with data records having such attributes as product type, number of visits and dollar amounts; the product type is used later as the*

partitioning attribute and the number of visits and dollar amounts as the x and y ordering attributes. The color represents the dollar amount spent by the corresponding customer wherein high dollar amounts correspond to bright colors and low dollar amounts to dark colors);

Drilling down from the pixel bar chart to derive (1) another pixel bar chart that displays numerical values of aggregated data for each of plural bars (*e.g., Figs. 7-8, 10, 12-17 and the corresponding description illustrating a plurality of multi-pixel bar charts with each bar chart displaying an aggregated distribution paradigm of data records including the display of numerical values, e.g., Figs. 10, 12 and 16; See Section 5.2 describes that Fig. 12 has displayed the height of a bar to show the average or aggregated value and the average/median lines are shown to separate a bar into two parts and therefore the average/median numerical values are shown as the heights of the plural bars. Moreover, the numerical values of the aggregated data for the plural bars are shown as the numbers on the top of the plural bars as shown in Figs. 4, , 10 and 12*) and (2) a graph that displays a comparison of the numerical values (*See column 1, Page 264 for Threshold interaction and Average/Median Lines wherein the cited reference teaches thresholds can be interactively changed and thus displayed as needed and the areas that exceed the threshold value are identified so that the colored areas display a comparison of the numerical values of the aggregated data. Moreover, the heights of the plural bars as displayed showed a comparison of the average values of the aggregated data for the plural bars to easily identify the difference in data distribution between the upper portions and lower portions of the plural bars; see Fig. 12a. Finally, Fig. 17 shows the high and low search criteria numerical value settings on the screen; see Page 268 for this teaching in the cited reference. See also Fig. 7 and Section 3.3-3.4 wherein the different levels of the hierarchy are indicated by different*

heights of bars belonging to that level and the colored pixels corresponding to the different attribute values of the same data item have a unique position within the bars. See Section 3.1 the high dollar amounts correspond to bright colors and low dollar amounts to dark colors) of aggregated data (*e.g., Fig. 2(a) also displays a graph that displays a comparison of the numerical values of aggregated data. A pixel bar chart is also a graph that displays a comparison of the numerical values of the aggregated data, e.g., Fig. 12 demonstrates the comparison of the average/median values for the plural bars. Moreover, each of the month numbers in the bar chart collectively represent each of the bars in the pixel bar chart and thus the numbers represent the numerical values of the aggregated data for the plural bars wherein comparison is shown by the colors of the pixels in the red area, green area, etc. representing the numerical values of the aggregated data beyond the threshold values because the data beyond the threshold values are collectively represented by the same color as visually displayed in the bar chart. Figs. 7-8, 10, 12-17 and the corresponding description illustrated a plurality of multi-pixel bar charts with each bar chart reflects the data distribution in the pixel placement algorithm wherein data partitioning is based on the data histograms* ***and data distributions according to the coloring clusters and trends are illustrated therein.*** *For example, Page 266 describes the graphical illustration that displays the busiest time in the middle of the day during hours 9, 10, 12 and 14 with wider bar widths of the bars in Fig. 16a wherein the wider bar widths clearly show a comparison in the numerical values of the aggregated data for the hours of concern. Moreover, the number of transactions are the numerical values of the aggregated data that are colored green in the pixel bar chart and therefore the numerical values of the aggregated data are displayed as green for comparison purposes. Moreover, in Fig. 16, red*

*areas > **25 seconds response time** are colored red which are used to display a comparison of the numerical values on the pixel bar chart. Finally, the average/median numerical values are shown as the heights of the plural bars. Moreover, the numerical values of the aggregated data for the plural bars are shown as the numbers on the top of the plural bars as shown in Figs. 4, , 10 and 12*).

Keim-2002 discloses hierarchical pixel bar charts to exploit the hierarchy and split the bars for selected portions of the hierarchy to show more detailed information for the selected portion of the data (Section 3.3 on Page 258). Keim-2002 discloses in Fig. 8(b), in a different setting, a data distribution paradigm. Moreover, Keim-2002 discloses in Fig. 8(b) the claim limitation of deriving a multi-level dynamic hierarchical structure (Section 3.3 of Keim-2002) for the data based on drilldown sequences input from a user by the *layered drill-down/detail-on-demand as disclosed and interactive data exploration and each customer's detail information can be drilled down as needed wherein the interactive selection allows the user to drill-down to see more details for interesting subsets of the data (Section 3.3 of Keim-2002)*, wherein the drilldown sequences automatically compute a graphical visual comparison of the data and comprise: deriving a multi-pixel bar chart to display an aggregated distribution paradigm and driving a graphical illustration to display a data distribution paradigm (**Page 258 and Section 3.3 and Fig. 7(b), Fig. 8(b)**).

Re Claim 11:

The claim 11 encompasses the same scope of invention as that of the claim 10 except additional claim limitation constructing a multi-level hierarchical tree having a plurality of different levels to graphically illustrate at least a portion of the data.

However, Keim-2002 further discloses constructing a multi-level hierarchical tree having a plurality of different levels to graphically illustrate at least a portion of the data (*e.g., Figs. 7-8 and Section 3.3 illustrated a plurality of multi-pixel bar charts with each pixel bar charts having a multi-level hierarchical structure*).

Re Claim 12:

The claim 12 encompasses the same scope of invention as that of the claim 10 except additional claim limitation the graphically displayable array comprises an X-axis and a Y-axis.

However, Keim-2002 further discloses the claim limitation the graphically displayable array comprises an X-axis and a Y-axis (*e.g., Figs. 3 and 6 wherein the pixel bar charts comprise an X-axis and a Y-axis).*

Re Claim 13:

The claim 13 encompasses the same scope of invention as that of the claim 12 except additional claim limitation the X-axis representing a data category and the Y-axis representing a data value.

However, Keim-2002 further discloses the claim limitation the X-axis representing a data category and the Y-axis representing a data value (*e.g., Figs. , 6 and 7-8 wherein the pixel bar*

charts comprise an X-axis and a Y-axis wherein the X-axis represents the product type and the Y-axis represents dollar amount).

Re Claim 14:

The claim 14 encompasses the same scope of invention as that of the claim 10 except additional claim limitation each pixel is encoded with a color.

However, Keim-2002 further discloses the claim limitation each pixel is encoded with a color (*e.g., Figs. 2, 6 and 7-8 wherein each pixel is encoded with color such as the coloring for the region, quantity, dollar amount or the no. of visits).*

Re Claim 15:

The claim 15 encompasses the same scope of invention as that of the claim 14 except additional claim limitation the pixels are encoded with a plurality of different colors.

However, Keim-2002 further discloses the claim limitation the pixels are encoded with a plurality of different colors (*e.g., Figs. 2, 6, and 7-8 wherein pixels are illustrated with darker colors or light colors).*

Re Claim 16:

The claim 16 is subject to the same rationale of rejection set forth in the claim 10.

Re Claim 17:

The claim 17 encompasses the same scope of invention as that of the claim 16 except additional claim limitation the graphical illustration to display an aggregated data paradigm is based on attributes from a previous hierarchical level.

However, Keim-2002 further discloses the claim limitation inputting the graphical illustration to display an aggregated data paradigm is based on attributes from a previous hierarchical level (*e.g., Section 3.3 discloses layered drill-down and detail-on-demand and multiple linked visualization allows the viewing of all related information after selecting a single data item*).

Re Claim 18:

The claim 18 encompasses the same scope of invention as that of the claim 16 except additional claim limitation the data distribution paradigm provides a chart with multiple colors to visually signify changes in data distribution at a record level.

However, Keim-2002 further discloses the claim limitation the data distribution paradigm provides a chart with multiple colors to visually signify changes in data distribution at a record level (*e.g., Fig. 16 shows the coloring of pixels to green or red and dark colors representing higher sales* ***and data distributions according to the coloring clusters and trends are illustrated therein;*** *see Page 266*).

Re Claim 20:

The claim 20 encompasses the same scope of invention as that of the claim 16 except additional claim limitation the data distribution paradigm comprises over one million data records.

However, Keim-2002 further discloses the claim limitation the data distribution paradigm comprises over one million data records (*e.g., Fig.16 disclose a large number of transaction records*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 4-5 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over D. Keim, M.C. Hao; U. Dayal; "**Hierarchical pixel bar charts**", IEEE Trans. On Visualization and Computer Graphics, Vol. 8, No. 3, July-Sept. 2002, pp. 255 – 269 (hereinafter Keim-2002) and Friedman et al. U.S. Patent No. 5,893,090 (hereinafter Friedman).

Re Claim 4:

The claim 4 encompasses the same scope of invention as that of the claim 1 except additional claim limitation that deriving a graphical illustration further comprises providing a comparison of product sales with average product sales to derive a difference in product sales.

Although Keim-2002 does not expressly disclose, "providing a comparison of product sales with average product sales to derive a difference in product sales", Keim-2002 discloses the ordering and partitioning attribute with the ordering and partitioning attribute including the difference between each of the product sales and average product sales wherein the comparison is performed by the clustered colored pixels. Keim-2002's Figs. 12-13 uses the height of a bar to show the average or aggregated value.

Keim-2002 discloses thresholding interaction on Page 264 wherein the user can define a threshold to identify the areas that exceed a value, for example, the areas above the threshold are colored red. Moreover, Keim-2002 also discloses pixel bar charts employing **average/median lines** that separates a bar into two parts with the upper part of the data exceeds the average/median value and the lower part of the data being below the average/median value (Keim-2002 Fig. 12a). Keim-2002 has disclosed the claim limitation of comparison in the pixel bar chart.

Friedman discloses the querying of data records and calculating the average from the data records and thus the difference between each of the product sales of the data records and the average product sales of the data records are calculated by querying statement (See Friedman column 4, lines 50-60 and column 6, lines 1-38). One of the ordinary skill in the art knows that the querying statement for the data records includes providing a comparison of product sales with average product sales to derive a difference in product sales.

It would have been obvious to one of the ordinary skill in the art to have modified Keim-2002's teaching and to have incorporated Friedman's teaching into Keim-2002 because in Keim-2002's pixel array ordering and grouping may be selected in accordance to the recalculated/renormalized product sales from the data records such that the product sale for each individual data record as being the original product sale minus the average product sale and such calculation is enabled by the querying statement according to the teaching of Friedman.

One of the ordinary skill in the art would have been motivated to visualize large volumes of multi-attribute data sets to explore and interpret the pixel bar chart system based on an ordering and partitioning attribute based on the querying statement (Keim-2002 Section 5.2).

Re Claims 2 and 5:

The claim 2 (5) encompasses the same scope of invention as that of the claim 1 except additional claim limitation of deriving standard deviations between a plurality of products.

Although Keim-2002 does not expressly disclose of deriving standard deviations between a plurality of products, Keim-2002 discloses the ordering and partitioning attribute with the ordering and partitioning attribute including the standard deviation between a plurality of products.

Friedman discloses the querying of data records and calculating the standard deviation from the data records and thus the standard deviations are calculated by querying statement for the data records (See Friedman column 4, lines 50-60 and column 6, lines 1-38). One of the ordinary skill in the art knows that the querying statement for the data records includes providing the deviation between a plurality of products from the data records.

It would have been obvious to one of the ordinary skill in the art to have modified Keim-2002's teaching and to have incorporated Friedman's teaching into Keim-2002 because in Keim-2002's pixel array ordering and grouping may be selected in accordance to the standard deviation of the data records and such calculation is enabled by the querying statement according to the teaching of Friedman. Keim-2002 teaches the interactive data exploration and visual querying and thus suggesting querying the standard deviation of the data records.

One of the ordinary skill in the art would have been motivated to visualize large volumes of multi-attribute data sets to explore and interpret the pixel bar chart system based on an ordering and partitioning attribute for analyzing the patterns, correlations and trends (Keim-2002 Section 5.2) by the querying statement.

Re Claim 19:

The claim 19 encompasses the same scope of invention as that of the claim 16 except additional claim limitation that deriving a graphical illustration further comprises providing a comparison of dollar amount of product sales with a dollar amount of average product sales.

Although Keim-2002 does not expressly disclose, "deriving a graphical illustration further comprises providing a comparison of dollar amount of product sales with a dollar amount of average product sales", Keim-2002 discloses the ordering and partitioning attribute wherein the ordering and partitioning attribute may be dollar amount of product sales or a dollar amount of average product sales.

Keim-2002 discloses thresholding interaction on Page 264 wherein the user can define a threshold to identify the areas that exceed a value, for example, the areas above the threshold are colored red. Moreover, **Keim-2002 also discloses pixel bar charts employing average/median lines that separates a bar into two parts with the upper part of the data exceeds the average/median value and the lower part of the data being below the average/median value** (Keim-2002 Fig. 12a) and thus Keim-2002's hierarchical pixel bar charts provide a comparison of dollar amount of product sales with a dollar amount of average product sales when applied to the product sales transaction data records of Keim. Keim-2002 has disclosed the claim limitation of comparison in the pixel bar chart.

Friedman discloses the querying of data records and calculating the average from the data records and the average product sales of the data records are calculated by querying statement (See Friedman column 4, lines 50-60 and column 6, lines 1-38). One of the ordinary skill in the

art knows that the querying statement for the data records include providing a comparison of dollar amount of product sales with a dollar amount of average product sales.

It would have been obvious to one of the ordinary skill in the art to have modified Keim-2002's teaching and to have incorporated Friedman's teaching into Keim-2002 because Keim-2002's pixel array ordering and grouping may be selected in accordance to the dollar amount of product sales or a dollar amount of average product sales and the aggregate querying is enabled by the querying statement according to the teaching of Friedman.

One of the ordinary skill in the art would have been motivated to visualize large volumes of multi-attribute data sets to explore and interpret the pixel bar chart system based on an ordering and partitioning attribute by the visual querying (Keim-2002 Section 5.2).

(10) Response to Argument

On Pages 6-7 of Argument, Appellant argues in essence with respect to the claim 1 and similar claims that:

(A) "In other words, Keim-2002 shows that a user can expand one pixel bar in a first chart to plural pixel bars in a second chart. Importantly, nowhere does Keim-2002 teach or even suggest drilling down to derive a pixel bar chart that 'displays numerical values of aggregated data for plural bars.' The pixel bar charts in Keim-2002 never even display numerical values of aggregated data. Where are the displayed numerical values of aggregated data in Keim-2002? They do not exist."

In response to the arguments in (A), appellant argues in essence with respect to the claim limitation, "displays numerical values of aggregated data for plural bars" set forth in the claim 1. The examiner respectfully disagrees with the appellant's arguments. Keim-2002 teaches the claim limitation of displaying numerical values of aggregated data for plural bars.

First of all, appellant's term "aggregated data" is broadly construed. Keim-2002 discloses in Fig. 12 simultaneously displaying numerical values of the day records for the plural bars. The day number corresponds to each respective pixel bar and reflects an aggregated data for the respective pixel bar because the plurality of pixels within a particular pixel bar have the common day number, i.e., the average value for the day records of the pixels is 7 for the first bar in Fig. 12 and 8 for the second bar. Since these numerical values 7 and 8 are also the average values (aggregated values) of the day records of pixels of the plural bars along the x-axis in the x-y diagram, the numerical values meet the claim limitation of "numerical values of aggregated data for plural bars represented by 7 and 8. In view of above, Keim-2002 at least teaches simultaneously displaying numerical values of the data records for plural bars along the x-axis on the x-y plot of the pixel bar charts. Thus, Keim-2002 teaches the claim limitation of simultaneously displaying numerical values of aggregated data for plural bars.

Even for the argument's sake that the claim limitation of "aggregated data" should be more specifically interpreted in terms of summation/average/standard deviation of the attribute values along the y-axis of the pixel bar charts in the x-y diagram in accordance with appellant's specification, Keim-2002 anticipate the claim limitation of simultaneously displaying numerical values of aggregated data for the plural bars on the y-axis for the following reasons.

In a non-limiting example, Keim-2002 teaches in Page 263-264, Section 5.2 the interactive data analysis including the hierarchical interaction of the plural pixel bar charts wherein a hierarchical drill-down and drill-up technique allows the viewing of all related information, e.g., the user may do a layered drill-down from a product sale category to focus on a particular product type for further analysis. A user can draw a bounding box anywhere in a pixel bar chart or identify a correlation (aggregated data) of the attribute values of a single data item. The user can define a threshold (aggregated data for the plural pixel bars) to identify the area of the pixel bars that exceed a value. In Fig. 12, for example, the areas above the threshold are colored red. Thresholds (numerical values of aggregated data for plural bars) can be interactively changed as needed (threshold values are displayed in order to be interactively changed).

In column 1, Section 5.2, Item 5, Keim-2002 specifically discloses aggregated values such as the values for the average/median lines. To show aggregated values, pixel bar charts can employ average/median lines and each average/median line separates the respective bar into two parts. The upper part of the data exceeds the average/median value and the lower part of the data is below the average/median value (See Fig. 12a). With a line divider, the user can easily identify the difference in data distribution between the two portions. The average lines correspond to the numerical values displayed along the y-axis (See Fig. 4 wherein the numerical values of aggregated data are displayed on the y-axis, for example, 5,000 and 15,000 are the total dollar amounts in the x-y diagram corresponding to at least two pixel bars in Fig. 4). Although the y-axis numerical values are omitted from the display of Fig. 12, the y-axis numerical values can be drawn corresponding to those in Fig. 4 and the numerical values of the average lines on the pixel bar charts can also be displayed as an overlay on each of the pixel bars in accordance with the

teaching of Figs. 16a-c wherein the numerical values and the pixel bars are displayed simultaneously.

The numerical values of the aggregated data for the plural bars can be further displayed by clicking on a pixel along each average line of the chart of Fig. 12a using the technique as disclosed with reference to the pixel bar charts of Fig. 16 to provide the pixel bar charts displaying the numerical values of the average lines (numerical values of the aggregated data). In Page 266 of Keim-2002, Section 6.2, Keim-2002 teaches by clicking on a specific pixel (labeled A in Fig. 16a-c), we may find out that the transaction A's response time on the y-axis is 8 seconds, corresponding to the response time y-axis on the x-y diagram. This technique applies to any of the pixel bar charts including the pixel bar charts in Fig. 12 to provide a plurality of pixel bar charts displaying the numerical values of the average lines. Therefore, the clicking of pixels along the average lines of Fig. 12 allow the direct and simultaneous display of the numerical values of the average round trip times, corresponding to the numerical values on the y-axis for the average lines in Fig. 12, on the pixel bar charts.

In view of above, Keim-2002 teaches simultaneously displaying numerical values of the average lines for plural bars along the y-axis on the x-y plot of the pixel bar charts to generate the pixel bar charts displaying the numerical values of the average lines on the plural bars. Thus, Keim-2002 clearly teaches the claim limitation of simultaneously displaying numerical values of aggregated data for plural bars.

On Page 7, Appellant argues in essence with respect to the claim 1 and similar claims that:

(B) "As another example, claim 1 recites drilling down to derive 'a graphical illustration that displays a comparison of the numerical values of aggregated data.' Keim-2002 does not teach this element. Again, Keim-2002 merely teaches that a user can expand one pixel bar in a first chart to plural pixel bars in a second chart. Keim-2002 never teaches or even suggests that drilling down from one pixel bar chart generates a graphical illustration that includes a comparison of aggregated data from the one pixel bar chart."

In response to the arguments in (B), appellant's claim limitation of "a comparison of the numerical values" is broadly construed because a comparison is a broad term.

First of all, appellant's term "a comparison of the numerical values of aggregated data" is broadly construed. Keim-2002 discloses in Fig. 12 simultaneously displaying numerical values of the day records for the plural bars. The day number corresponds to each respective pixel bar and reflects an aggregated data for the respective pixel bar because the plurality of pixels within a particular pixel bar have the common day number, i.e., the average value for the day records of the pixels is 7 for the first bar in Fig. 12 and 8 for the second bar. Since these numerical values 7 and 8 are also the average values (aggregated values) of the day records of pixels of the plural bars along the x-axis in the x-y diagram, the numerical values meet the claim limitation of "numerical values of aggregated data for plural bars represented by 7 and 8. In view of above, Keim-2002 at least teaches displaying a comparison of the numerical values of aggregate data for plural bars wherein 7 and 8 are the numerical values of the aggregated for the first bar and the

second bar along the x-axis in the two-dimensional diagram. Thus, Keim-2002 teaches the claim limitation of deriving a graphical illustration that displays a comparison of the numerical values of aggregated data in the pixel bar charts.

Even for the argument's sake that the claim limitation of "aggregated data" should be more specifically interpreted in terms of summation/average/standard deviation of the attribute values along the y-axis of the pixel bar charts in the x-y diagram in accordance with appellant's specification, Keim-2002 anticipate the claim limitation of displaying a comparison of the numerical values of aggregated data for the plural bars on the y-axis for the following reasons.

In a non-limiting example, Keim-2002 teaches the claim limitation of deriving a graphical illustration that displays **a comparison** of the numerical values. The relevant teaching of the cited reference can be found at column 1, Page 264. Threshold interaction and Average/Median Lines on the pixel bar charts allow the comparison of numerical values of the aggregated data to be shown on the x-y diagram. Keim-2002 teaches thresholds can be interactively changed and thus displayed as needed and **the areas that exceed the threshold value are identified so that the colored areas display** a comparison of the numerical values of the aggregated data. Keim-2002 teaches drilling down and drilling up the hierarchical pixel bar charts allowing the display of the numerical values of the aggregated data of plural bars to be compared. For example, the heights of the plural bars as displayed on the y-axis of the x-y diagram showed a comparison of the average values of the aggregated data for the plural bars to easily identify the difference in data distribution between the upper portions and lower portions of the plural bars; see Fig. 12a. The numerical values of the day records for the plural bars are

also shown on the x-axis of the x-y diagram of the pixel bar charts wherein the numerical values are the aggregated data of the plural bars.

In a further non-limiting example, Fig. 17 of Keim-2002 shows the high and low search criteria numerical value settings on the screen; see also Page 268 for this teaching in the cited reference. In Fig. 7 and Section 3.3-3.4, the different levels of the hierarchy are indicated by different heights of bars belonging to that level and the colored pixels corresponding to the different attribute values of the same data item have a unique position within the bars. In Section 3.1, it stated that the high dollar amounts correspond to bright colors and low dollar amounts to dark colors and the dollar amounts are shown on the y-axis of the x-y plot of the pixel bar charts. In Figs. 7-8, 10, 12-17 and the corresponding description, a plurality of multi-pixel bar charts is shown with each bar chart reflects the data distribution in the pixel placement algorithm wherein data partitioning is based on the data histograms **and data distributions according to the coloring clusters and trends are illustrated therein**. For example, Page 266 describes the graphical illustration that displays the busiest time in the middle of the day during hours 9, 10, 12 and 14 having wider bar widths of the bars as shown in Fig. 16a. The wider bar widths clearly show a comparison in the numerical values of the aggregated data for the hours of concern. Moreover, the number of transactions are the numerical values of the aggregated data that are colored green in the pixel bar chart and therefore the numerical values of the aggregated data are displayed as green for comparison purposes. Moreover, in Fig. 16, red areas > **25 seconds response time** are colored red which are further used to display a comparison of the numerical values on the pixel bar chart. Finally, the average/median numerical values are shown as the heights of the plural bars. Moreover, the numerical values of the aggregated data for the plural

bars are shown as the numbers on the top of the plural bars in *Figs. 4, 10 and 12 in which Figs. 2 and 4 show the numerical values corresponding to the heights of the bars and so the numerical values corresponding to the median lines of the bars in Fig. 12 are determined according to their heights*.

Moreover, the numerical values of the aggregated data for the plural bars can be further displayed by clicking on each pixel along each average line of the chart of Fig. 12a using the technique as disclosed with reference to the pixel bar charts of Fig. 16a-c. In Page 266 of Keim-2002, Section 6.2, Keim-2002 teaches by a clicking on each pixel of a pixel bar (Fig. 16a-c), we may find out that the transaction A's response time is 8 seconds, corresponding to the response time on the y-axis in the diagram. This technique applies to any of the pixel bars including the pixel bar charts in Fig. 12 wherein the corresponding y-axis numerical value of each pixel can be found by clicking on the pixel. Therefore, the clicking of pixels along the average lines of Fig. 12 enables the direct and simultaneous display of the numerical values for the average round trip times that correspond to the numerical values on the y-axis for the average lines in Fig. 12.

In view of above, Keim-2002 teaches displaying a comparison of the numerical values of the average lines for plural bars along the y-axis on the x-y plot of the pixel bar charts. Thus, Keim-2002 clearly teaches the claim limitation of displaying a comparison of the numerical values of aggregated data for plural bars.

On Pages 7-8, Appellant argues in essence with respect to the claim 10 and similar claims that:

(C) "Keim-2002 shows drilldown sequences that compute a pixel bar chart, not a graph and another pixel bar chart. For example, in Fig. 7b in Keim-2002 shows pixel bars computed from a drilldown sequence of a bar in Fig. 7a. Notice that nowhere do any of the bars show 'numerical values of aggregated data.' Further, notice that nowhere does Keim-2002 disclose that his drilldown sequences from a bar in Fig. 7a compute a graph and displays comparisons of numerical values of aggregated data that are in the pixel bar chart."

In response to the arguments in (C), appellant argues in essence with respect to the claim limitation, "displays numerical values of aggregated data for plural bars" set forth in the claim 10. The examiner's responses to the arguments in (A) and (B) also apply to the arguments in (C).

Moreover, appellant's arguments are limited to Keim-2002's Fig. 7a and 7b, while ignoring the other sections and Figures in Keim-2002's reference. Appellant argues that Fig. 7a and 7b do not show the numerical values. However, Appellant ignores the overall teachings of Keim-2002. The drilling up and drilling down in the hierarchical pixel bar charts apply to any pixel bar charts, e.g., Figs. 10 and 12-15 wherein layered drill-down are taught. For example, Fig. 10 clearly shows the drilling down sequence on the day 13 in the first level of hierarchy and the hours partitioning on the second level of hierarchy and the 15-minutes intervals on the third level of hierarchy. Drilling down on the day 13 is just one example. Moreover, each numerical value along the horizontal axis also represents the average value of the data records of the pixels for a particular bar because every pixel lying in a particular bar has the same numerical value corresponding the attribute on the horizontal axis.

In a non-limiting example, Keim-2002 teaches in Page 263-264, Section 5.2 the interactive data analysis including the hierarchical interaction of the plural pixel bar charts wherein a hierarchical drill-down and drill-up technique allows the viewing of all related information, e.g., the user may do a layered drill-down from a product sale category to focus on a particular product type for further analysis. A user can draw a bounding box anywhere in a pixel bar chart or identify a correlation (aggregated data) of the attribute values of a single data item. The user can define a threshold (aggregated data for the plural pixel bars) to identify the area of the pixel bars that exceed a value. In Fig. 12, for example, the areas above the threshold are colored red. Thresholds (numerical values of aggregated data for plural bars) can be interactively changed as needed (threshold values are displayed in order to be interactively changed).

In column 1, Section 5.2, Item 5, Keim-2002 specifically discloses aggregated values such as the values for the average/median lines. To show aggregated values, pixel bar charts can employ average/median lines and the average/median line separates a bar into two parts and for comparison purposes the average/median lines are drawn for plural bars. The upper part of the data exceeds the average/median value and the lower part of the data is below the average/median value (See Fig. 12a). With a line divider, the user can easily identify the difference in data distribution between the two portions. The average lines correspond to the numerical values displayed along the y-axis (See Fig. 4 wherein the numerical values of aggregated data are displayed on the y-axis, for example, 5,000 and 15,000 are the total dollar amounts (aggregated data) in the x-y diagram corresponding to at least two pixel bars in Fig. 4). Although the y-axis numerical values are omitted from the display of Fig. 12, the y-axis numerical values can be drawn wherein the aggregated values can be found similar to those in

Fig. 4 and the numerical values of the average lines can also be displayed as an overlay on the pixel bars in accordance with the teaching of Figs. 16a-c wherein the numerical values and the pixel bars are displayed simultaneously.

Moreover, the numerical values of the aggregated data for the plural bars can be further displayed by clicking on each pixel along each average line of a pixel bar in Fig. 12a using the technique as disclosed with reference to the pixel bar charts of Fig. 16. In Page 266 of Keim-2002, Section 6.2, Keim-2002 teaches by clicking on each pixel of the pixel bar (Fig. 16), we may find out that the transaction A's response time is 8 seconds, corresponding to the response time y-axis on the x-y diagram. This technique applies to any bar in the pixel bar charts including the pixel bar charts in Fig. 12. Therefore, the clicking of pixels along the average lines of Fig. 12 allows the direct and simultaneous display of the numerical values for the average round trip times that correspond to the numerical values on the y-axis for the average lines in Fig. 12.

On Page 8, Appellant argues in essence with respect to the claim 11 and similar claims that:

(D) "Nowhere does Keim-2002 disclose a hierarchical tree."

In response to the arguments in (D), Keim-2002 teaches the hierarchical pixel bar charts having hierarchical levels wherein the hierarchical levels of the pixel bar charts are constructed. The pixel bars in the second level hierarchy can be drawn by drilling down from a pixel bar in the first level hierarchy and the pixel bars in the third level hierarchy can be further drawn by further drilling down from a pixel bar in the second level hierarchy. The pixel bar constitutes a

node of the hierarchy tree and the drilling path constitutes an edge/path for connecting the pixel bar from the higher level to a pixel bar in the lower level. Thus, Keim-2002 inherently teaches a hierarchical tree in his drilling down or drilling up traversal of the pixel bars within the multiple hierarchical levels.

On Pages 8-9, Appellant argues in essence with respect to the claim 16 and similar claims that:

> (E) "Keim-2002 shows drilldown sequences that compute a pixel bar chart, not a graph and another pixel bar chart. For example, in Fig. 7b in Keim-2002 shows pixel bars computed from a drilldown sequence of a bar in Fig. 7a. Notice that nowhere do any of the bars show 'numerical values of aggregated data.' Further, notice that nowhere does Keim-2002 disclose that his drilldown sequences from a bar in Fig. 7a compute a graph and displays comparisons of numerical values of aggregated data that are in the pixel bar chart."

In response to the arguments in (E), appellant argues in essence with respect to the claim limitation, "displays numerical values of aggregated data for plural bars" set forth in the claim 10. The examiner's responses to the arguments in (A) and (B) also apply to the arguments in (E).

Moreover, appellant's arguments are limited to Keim-2002's Fig. 7a and 7b, while ignoring the other sections and figures of the Keim-2002 reference. Appellant argues that Fig. 7a and 7b do not show the numerical values. However, Appellant ignores the overall teachings of

Keim-2002. The drilling up and drilling down in the hierarchical pixel bar charts apply to any pixel bar charts, e.g., Figs. 10 and 12-15 wherein layered drill-down are taught and drilling-down or drilling up produce a sequence of hierarchical pixel bar charts and thus Keim-2002 teaches "deriving a multi-pixel bar chart" and "deriving a graphical illustration".

For example, Fig. 10 clearly shows the drilling down sequence on the day 13 in the first level of hierarchy and the hours partitioning on the second level of hierarchy and the 15-minutes intervals on the third level of hierarchy. For example, each numerical value along the horizontal axis labeling each pixel bar also represents the average value of the data records of the pixels for that particular bar because every pixel lying in the particular bar has the same numerical value for the attribute plotted on the horizontal axis.

In a non-limiting example, Keim-2002 teaches in Page 263-264, Section 5.2 the interactive data analysis including the hierarchical interaction of the plural pixel bar charts wherein a hierarchical drill-down and drill-up technique allows the viewing of all related information, e.g., the user may do a layered drill-down from a product sale category to focus on a particular product type for further analysis. A user can draw a bounding box anywhere in a pixel bar chart or identify a correlation (aggregated data) of the attribute values of a single data item. The user can define a threshold (aggregated data for the plural pixel bars) to identify the area of the pixel bars that exceed a value. In Fig. 12, for example, the areas above the threshold are colored red. Thresholds (numerical values of aggregated data for plural bars) can be interactively changed as needed (threshold values are displayed in order to be interactively changed).

In column 1, Section 5.2, Item 5, Keim-2002 specifically discloses aggregated data such as the values for the average/median lines corresponding to the values on the y-axis. Keim-2002

specifically discloses the aggregated values. According to Section 5.2 of Keim-2002, to show aggregated values, pixel bar charts can employ average/median lines and the average/median line separates a bar into two parts. The upper part of the data exceeds the average/median value and the lower part of the data is below the average/median value (See Fig. 12a). With a line divider, the user can easily identify the difference in data distribution between the two portions. The average lines correspond to the numerical values displayed along the y-axis (See Fig. 4 wherein the numerical values of aggregated data are displayed on the y-axis, for example, 5,000 and 15,000 are the total dollar amounts in the x-y diagram corresponding to at least two pixel bars in Fig. 4). Although the y-axis numerical values are omitted from the display of Fig. 12, the y-axis numerical values can be drawn corresponding to those in Fig. 4 and the numerical values of the average lines can also be displayed as an overlay on the pixel bars in accordance with the teaching of Figs. 16a-c wherein the numerical values and the pixel bars are displayed simultaneously.

Moreover, the numerical values of the aggregated data for the plural bars can be further displayed by clicking on each pixel along an average line of the bar of Fig. 12a using the technique as disclosed with reference to the pixel bar charts of Fig. 16a-c. In Page 266 of Keim-2002, Section 6.2, Keim-2002 teaches by clicking on each pixel of a bar in the pixel bar chart (Fig. 16a-c), we may find out that the transaction A's response time is 8 seconds, corresponding to the response time y-axis on the x-y diagram. This technique applies to any of the pixel bar charts including the pixel bar charts in Fig. 12. Therefore, the clicking of pixels along the average lines of Fig. 12 allow the direct and simultaneous display of the numerical values of the

average round trip times that correspond to the numerical values on the y-axis for the average lines in Fig. 12.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Jin-Cheng Wang Jin-Cheng Wang

Conferees:

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